# Machine Learning Basics

**What is Machine Learning?**
Machine learning is a subset of artificial intelligence that enables systems to learn and improve from experience without being explicitly programmed. It focuses on developing computer programs that can access data and use it to learn for themselves.

**Types of Machine Learning:**
1. **Supervised Learning:** The algorithm learns from labeled training data. Examples include classification and regression problems.
2. **Unsupervised Learning:** The algorithm finds patterns in unlabeled data. Examples include clustering and dimensionality reduction.
3. **Reinforcement Learning:** The algorithm learns through trial and error by receiving rewards or penalties.

**Key Concepts:**
- **Training Data:** The dataset used to train the machine learning model.
- **Features:** Individual measurable properties or characteristics of the data.
- **Model:** The mathematical representation learned from the training data.
- **Overfitting:** When a model learns the training data too well and performs poorly on new data.
- **Underfitting:** When a model is too simple to capture the underlying patterns in the data.

**Common Algorithms:**
- Linear Regression: Predicts continuous values
- Logistic Regression: Classification algorithm for binary outcomes
- Decision Trees: Tree-like model of decisions
- Random Forest: Ensemble of decision trees
- Neural Networks: Inspired by biological neural networks
- Support Vector Machines: Finds optimal hyperplane for classification

**Applications:**
Machine learning is used in recommendation systems, image recognition, natural language processing, fraud detection, autonomous vehicles, and many more areas.